7. (Amended) A method as claimed in claim 1 wherein at least one of said first and second filters includes a correction for noise in said representative measure of intensity.

8. (Amended) A method as claimed in claim 1 including the step of producing said representative measures of intensity and rate of change of intensity over said selected surface by producing representative measurements corresponding to intensity over at least two spaced apart surfaces extending across the wave field.

11. (Amended) A method as claimed in claim 8 including the step of directly detecting representative measures of intensity over said spaced apart surfaces.

12. (Amended) A method as claimed in claim 8 including the step of producing said representative measure of intensity over at least one of said spaced apart surfaces by imaging that surface.

13. (Amended) A method as claimed in claim 8 wherein said spaced apart surfaces are substantially parallel.

15. (Amended) A method as claimed in claim 8 wherein said representative measure of rate of change of intensity is produced by subtraction of representative measurements of intensity respectively made at locations over said spaced apart surfaces.

16. (Amended) A method as claimed in claim 1 wherein said representative measures of intensity and rate of change of intensity are obtained by sampling measurements at selected locations over said surface.

18. (Amended) A method as claimed in claim 2 wherein said radiation wave field propagates in a z-direction of a Cartesian co-ordinate system and further including the step of producing an x component and a y component of phase separately.

21. (Amended) A method as claimed in claim 1 including the step of obtaining said representative measure of rate of change of intensity by obtaining a first representative measurement over a measurement surface across the wave field for radiation of a first energy and obtaining a second representative measurement over said measurement surface for radiation of a second different energy.

22. (Amended) A method as claimed in claim 2 wherein at least one of said first filter and said second filter include a correction for aberrations in said representative measures of intensity and rate of change of intensity by including at least one component dependent on the aberration, coefficients of a system producing the representative measures.

25. (Amended) A computer program to execute the steps of claim 1.

26. (Amended) A computer program stored on computer readable storage media including means to execute the steps of claim 1.

30. (Amended) An apparatus as claimed in claim 27 wherein said first and second differential operators are second order differential operators.

31. (Amended) An apparatus as claimed in claim 27 wherein said first filter is substantially the same as said second filter.

32. (Amended) An apparatus as claimed in claim 27 wherein said first filter includes selectively suppressing first higher frequencies of the first integral transform representation.

33. (Amended) An apparatus as claimed in claim 27 wherein at least one of said first and second filters includes a correction for noise in said representative measure of intensity.

34. (Amended) An apparatus as claimed in claim 27 including means to produce representative measurements corresponding to intensity over at least two spaced apart surfaces extending across the wave field.

37. (Amended) An apparatus as claimed in claim 34 including detector means positioned to directly detect representative measures of intensity over said spaced apart surfaces.

38. (Amended) An apparatus as claimed in claim 34 including detector means to produce said representative measure of intensity over at least one of said spaced apart surfaces and imaging means to image that surface onto the detector.

39. (Amended) An apparatus as claimed in claim 34 wherein said spaced apart surfaces are substantially parallel.

40. (Amended) An apparatus as claimed in claim 34 wherein said spaced apart surfaces are substantially planar.

41. (Amended) An apparatus as claimed in claim 34 wherein said means to produce said representative measure of rate of change of intensity subtracts representative measurements of intensity respectively made at locations over said spaced apart surfaces.

42. (Amended) An apparatus as claimed in claim 27 wherein said means to produce a representative measure of intensity and said means to produce a representative measure of rate of change of intensity sample at selected locations over said surface.

44. (Amended) An apparatus as claimed in claim 28 wherein said radiation wave field propagates in a z-direction of a Cartesian co-ordinate system and processing means produces an x component and a y component of phase separately.

47. (Amended) An apparatus as claimed in claim 27 wherein said representative measure of rate of change of intensity is produced by obtaining a first representative measurement over a measurement surface across the wave field for radiation of a first energy and obtaining a second representative measurement over said measurement surface for radiation of a second different energy.

48. (Amended) An apparatus as claimed in claim 28 wherein at least one of said first filter and said second filter include a correction for aberrations in said representative measures of intensity and rate of change of intensity by including at least one component dependent on the aberration, coefficients of a system producing the representative measures.

55. (Amended) A method as claimed in claim 52 wherein said spaced apart surfaces are substantially parallel.

56. (Amended) A method as claimed in claim 52 wherein said spaced apart surfaces are substantially planar.

57. (Amended) A method as claimed in claim 52 wherein said representative measure of rate of change of intensity is produced by subtraction of representative measurements of intensity respectively made at locations over said spaced apart surfaces.

60. (Amended) A method as claimed in claim 51 including the step of directly detecting representative measures of intensity over said spaced apart surfaces.

61. (Amended) A method as claimed in claim 51 wherein said selected surface is spaced apart from said object in the direction of propagation of said radiation.

62. (Amended) A method as claimed in claim 51 wherein said source is substantially a point source.

63. (Amended) A method as claimed in claim 51 wherein said first and second integral transforms are produced using a Fourier transform.

64. (Amended) A method as claimed in claim 51 wherein said Fourier transform is a Fast Fourier transform.

69. (Amended) An apparatus as claimed in claim 66 including detector means positioned to directly detect representative measures of intensity over said spaced apart surfaces.

70. (Amended) An apparatus as claimed in claim 66 including detector means to produce said representative measure of intensity over at least one of said spaced apart surfaces and imaging means to image that surface onto the detector.

71. (Amended) An apparatus as claimed in claim 66 wherein said spaced apart surfaces are substantially parallel.

72. (Amended) An apparatus as claimed in claim 66 wherein said representative measure of rate of change of intensity is produced by subtraction of representative measurements of intensity respectively made at locations over said spaced apart surfaces.

75. (Amended) An apparatus as claimed in claim 65 including means to directly detecting representative measures of intensity over said spaced apart surfaces.

76. (Amended) An apparatus as claimed in claim 65 wherein said selected surface is spaced apart from said object in the direction of propagation of said radiation.

77. (Amended) An apparatus as claimed in claim 65 wherein said source is substantially a point source.

78. (Amended) An apparatus as claimed in claim 65 wherein said first and second integral transforms are produced using a Fourier transform.

82. (Amended) A method as claimed in claim 80 said first focus of the imaging system produces an infocus image at the imaging surface and said second focus of the imaging system produces a slightly defocused image at the imaging surface.

83. (Amended) A method as claimed in claim 80 wherein said imaging surface is substantially planar.

84. (Amended) A method as claimed in claim 80 wherein the imaging surface is an intensity detector.

85. (Amended) A method as claimed in claim 80 wherein said imaging surface is said selected surface.

86. (Amended) A method as claimed in claim 80 wherein said integral transform is a Fourier transform.

88. (Amended) A method as claimed in claim 80 wherein said representative measure of rate of change of intensity is produced by subtraction of said first and second representative measurements of intensity.

89. (Amended) A method as claimed in claim 80 wherein said representative measures of intensity and rate of change of intensity are obtained by sampling measurements at selected location over said imaging surface.

96. (Amended) An apparatus as claimed in claim 94 said first focus of the imaging system produces an infocus image at the imaging surface and said second focus of the imaging system produces a slightly defocused image at the imaging surface.

97. (Amended) An apparatus as claimed in claim 94 wherein said imaging surface is substantially planar.

98. (Amended) An apparatus as claimed in claim 94 wherein the imaging surface is an intensity detector.

99. (Amended) An apparatus as claimed in claim 94 wherein said imaging surface is said selected surface.

100. (Amended) An apparatus as claimed in claim 94 wherein said integral transform is a Fourier transform.

102. (Amended) An apparatus as claimed in claim 94 wherein said representative measure of rate of change of intensity is produced by subtraction of said first and second representative measurements of intensity.

103. (Amended) An apparatus as claimed in claim 94 wherein said representative measures of intensity and rate of change of intensity are obtained by sampling measurements at selected location over said imaging surface.